Biodynamics, a promising road to soil fertility and tomorrow's sustainable agriculture

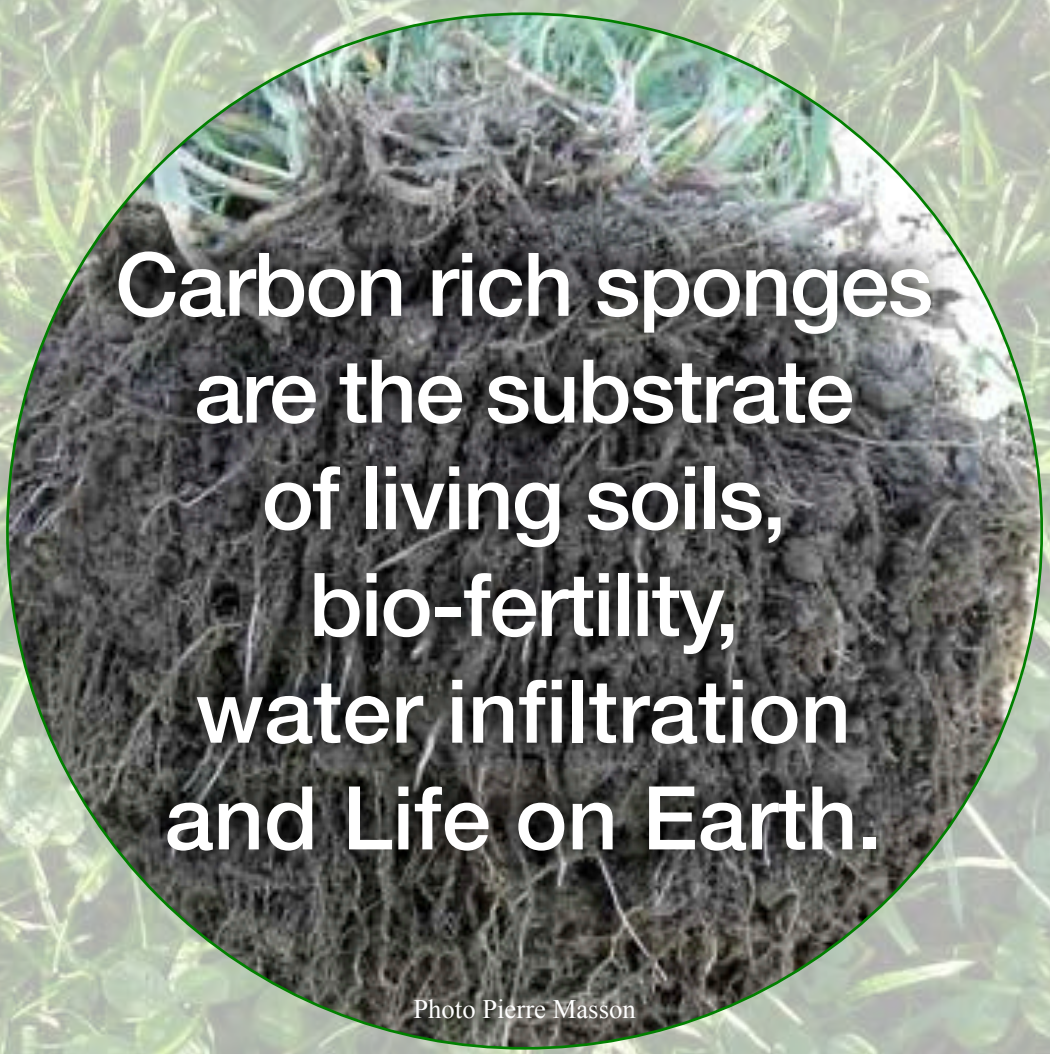


Photo Pierre Masson

Association pour la Recherche
Soin de la Terre
sur les Pratiques en agriculture BioDynamique

Ulrich Schreier

www.soin-de-la-terre.org

Inspired by Rudolf Steiner in 1924, biodynamics was the first consciously organised organic and agro-ecology movement and first in 1928 to certify its products by creating the Demeter trade mark. Through a more profound and holistic vision of Nature and Life, biodynamic agriculture tries to work in close harmony with their laws in an attempt to achieve high quality standards for its products while putting a high priority on animal well-being as well as its environmental and social impact.

In some respects the elder brother of organic farming, biodynamics continues to be an important source of inspiration for many farmers and gardeners. This is the case in particular with respect to plant extracts, certain weed and pest management techniques and the work with the biodynamic solar, lunar and planetary calendar.

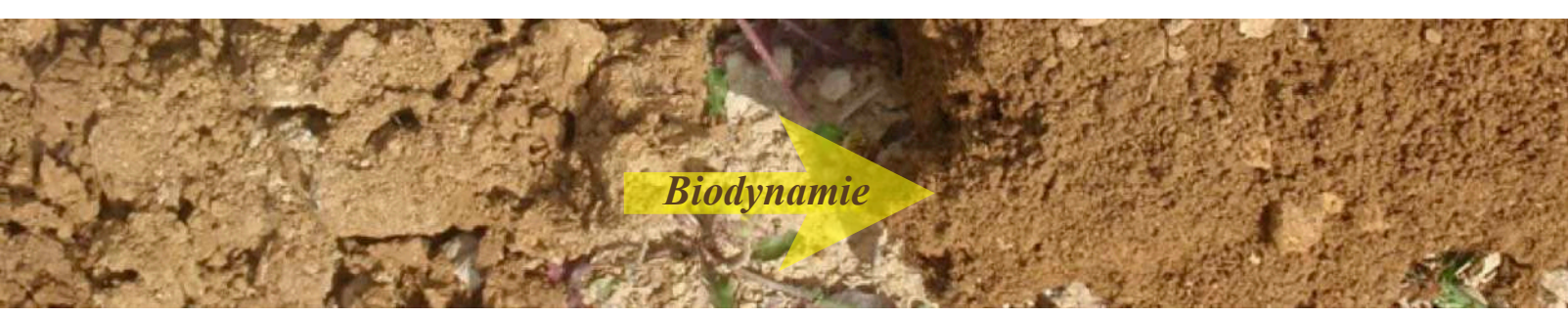
Present on all five continents biodynamics is well established in Australia, India and in the German speaking countries. In France it is well known for its excellent results in viticulture and is now practiced by many internationally renowned vineyards. The results are often spectacular: improved soil life and plant health, increased levels of soil organic matter and improved behaviour of the vines, including during wet and dry spells, less soil erosion, a favorable environmental impact. The result of these changes for the wine are enhanced taste, aromas, balance and overall quality.

As can be seen from the results in viticulture where it is a great help in running a vineyard organically, but also in many other areas, biodynamic agriculture is able to restore worn-out soils with minimal resources and in a very short period of time. In addition, by increasing soil carbon and building soil structure and fertility, it helps trap large amounts of carbon dioxide.

Proposing many innovative solutions towards the development of a truly sustainable and largely autonomous farming system, it appears urgent that biodynamics gets to be more widely known not only by farmers, consultants and researchers but also_by government representatives and the general public. It is with this goal in mind that the document ***Biodynamics: a promising road to tomorrow's sustainable agriculture*** has been put together. Enhanced by many photographs, illustrations, references and internet links, it deals with the origins of biodynamics, the vision it is based on, some of its key aspects and most importantly it shows many of the ***outstanding results with regard to soil development, vigour and health of plants, taste and nutritional value of its products.***

Version française

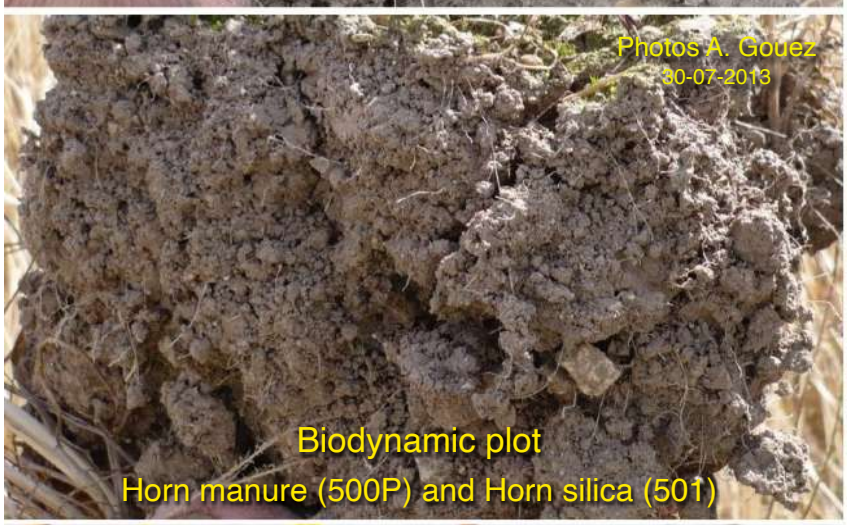
Deutsche Version

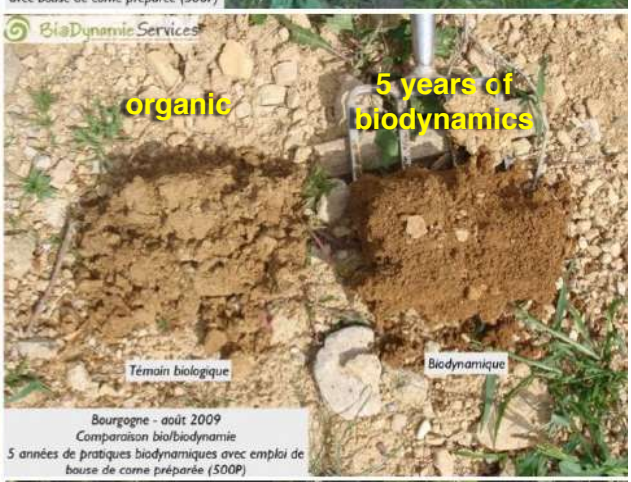



Multi species pasture in the Loire Valley
Organic reference plot
Biodynamic plot (500P)
Photo B. Desbois, 2015


Soil development after 3 years of Biodynamics
Champagne Region - Cereal cropping on Chalky subsoil
Organic reference plot


Bio Dynamie Services
organic
5 years of biodynamics
Témoin biologique
Biodynamique
Côtes du Rhône - Sols de loess
Mars 2011
5 années de pratiques biodynamiques avec bouse de corne préparée (500P)


Photos A. Gouez
30-07-2013
Biodynamic plot
Horn manure (500P) and Horn silica (501)


Bio Dynamie Services
organic
5 years of biodynamics
Témoin biologique
Biodynamique
Bourgogne - août 2009
Comparaison bio/biodynamie
5 années de pratiques biodynamiques avec emploi de bouse de corne préparée (500P)


Green house salads in Verona, Italy
Organic plot
biodynamic plot
Photo Adriano Zago spring 2012


Côtes du Rhône - Mourvèdre : leaf behavour is typical for biodynamics with Horn Manure (500P) and Horn Silica (501): shiny leafs standing up with individualized positioning.
biodynamic
Côtes du Rhône - Mourvèdre : comportement foliaire caractéristique de la biodynamie avec bouse de corne préparée (500P) et silice de corne (501) : brillance des feuilles, redressement, positionnement individualisé.
Pierre Masson
Agriculture Bio-Dynamique
formation conseil


Côtes du Rhône - Mourvèdre : same plot as below at the same time but without the biodynamic preparations: the leaves are matt and fall like a curtain resulting in poor air circulation.
Organic plot
Côtes du Rhône - même parcelle, même heure Mourvèdre témoin ne recevant pas les préparations biodynamiques : feuilles mates tombant en rideaux
Soin de la Terre
Pierre Masson
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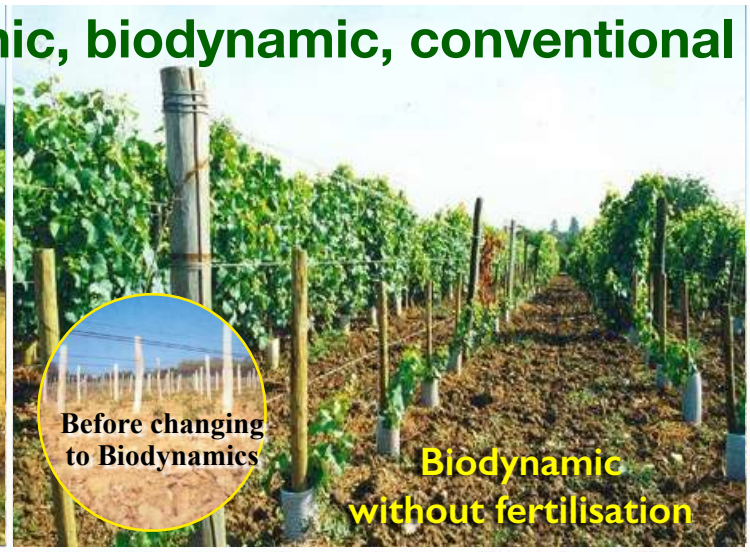
Comparitive studies : organic, biodynamic, conventional

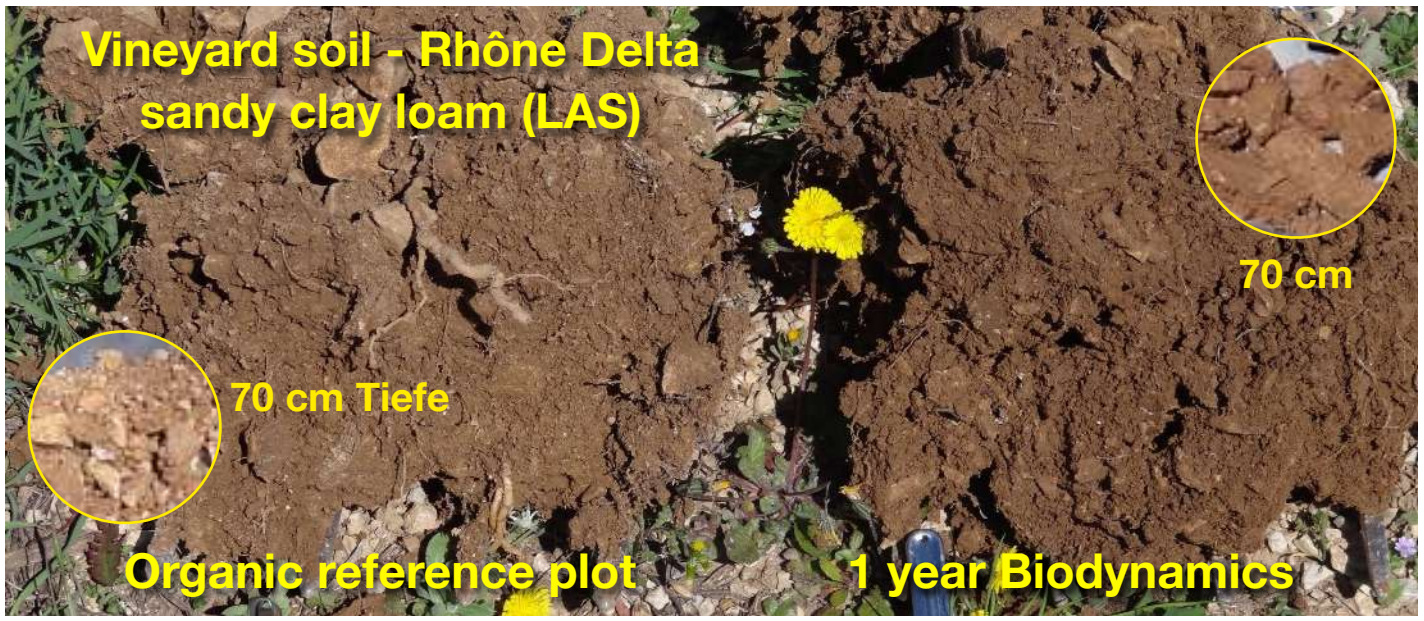


The biodynamic preparations improve the fermentation of liquid manure

Testimony of a dairy farmer

Since we have a large manure pit equipped with a stirring system, we implemented a method recommended by Vincent Masson: with the stirring system running we use little balls of the compost preparations which we throw into the at 10 second intervals : on the first morning we apply the preparation 502, in the afternoon the 503, the next morning the 504, etc. … and last we spay the valerian over the whole pit while shutting off the stirring system for 4 hours. We have noticed **a significant change in less than 3 weeks**: homogenisation, easier stirring and smooth texture with a vanilla type odour ...

Click here for more information on the research carried out by our association

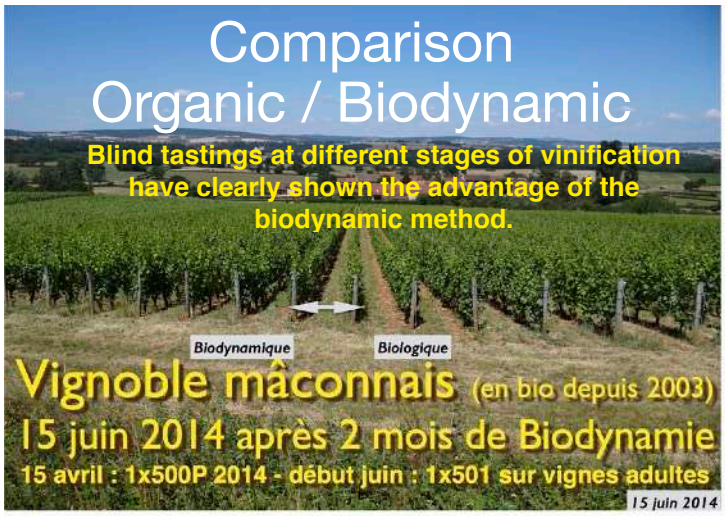


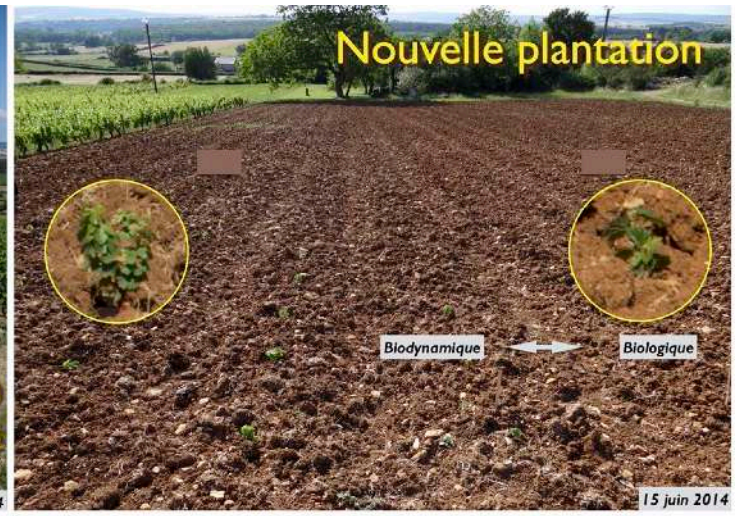
- the color of the soil is fairly light
- average soil structure
- poor root development
- less olfactory aromas
- sticks to fingers when wet
- dries fast
- organic matter content : 2,96%
- pH$_{KCL}$ 7,4 – N = 1,662 mg/g – C/N = 10,4
- P_2O_5 = 0,179 mg/g – K_2O = 0,184 mg/g
- MgO = 0,191 mg/g – CEC = 10,3 cmol+/kg
- microbial biomass : 264 mg/kg

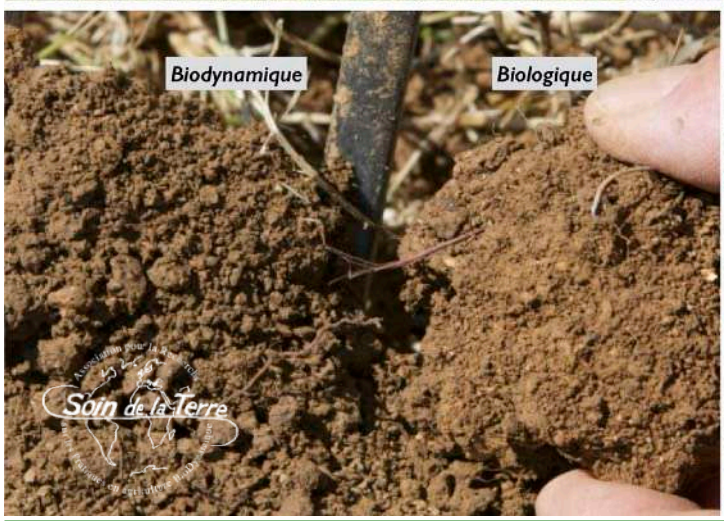
- dark brown color
- good organic structure
- good root development
- rich and refined aromatic scent
- sticks much less
- holds back water, dries slowly
- 3,27% (+10% = +7 t C = +26 t CO_2)
- pH$_{KCL}$ 7,3 – N = 1,741 mg/g – C/N = 11
- P_2O_5 = 0,183 mg/g – K_2O = 0,229 mg/g
- MgO = 0,244 mg/g – CEC = 12,9 cmol+/kg
- 347 mg/kg (+ 83mg/kg = +31%)

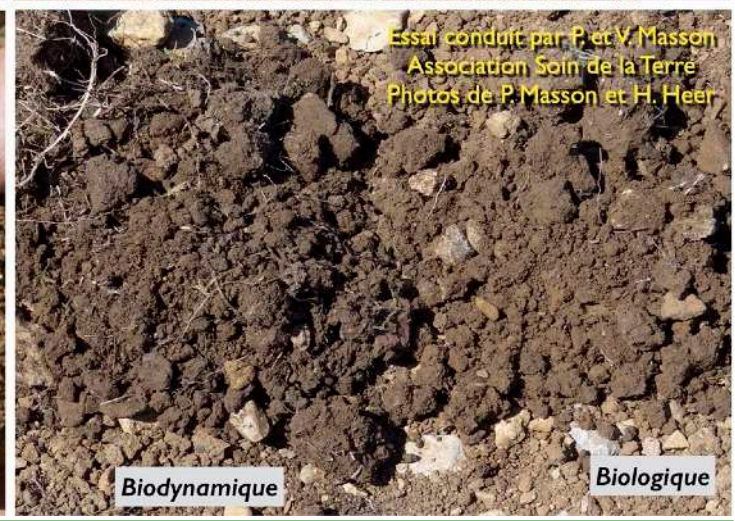
The morpho-chromatograms provide additional information on humus quality as well as on the organizational and life forces of the soil. Like the observational findings and the quantitative measurements, they clearly show the positive influence of the biodynamic preparations.

*) Quatitative analysis by Laboratoires LCA and CelestaLab ; Morpho-chromatograms by Soin de la Terre









From the very first harvest, the development of the soil and the health of the vines are reflected in the quality of the wine!

Soil Analysis after 8 months by LCA

Paramètre /Parcelle	Couleur	MO %	N total %	C/N	PH eau	pH KCl	Calc total	Ca0 g/kg	CEC Metson	P2O5 Joret	K2O	Mg0	K/Mg	K2O/ MgO	Mn ech	Na2O	Cu mg/Kg
Plantion BIO	Rouge	**3,41**	0,19	10,4	8,1	7,3	13	9,31	19,6	0,58	0,58	0,18	1,36	3,18	2,7	0,02	4,1
Plantion Biodynamie	Marron	**5,11**	0,28	10,6	8	7,3	13	8,13	23,6	0,04	0,32	0,22	0,63	1,47	3,86	0,02	0,36
Vigne Bio	Rouge	**2,7**	0,17	9,2	8,4	7,6	86	12,3	17,6	0,12	0,46	0,15	1,34	3,14	2,57	0,02	3,35
Vigne Biodynamie	Marron	**4,15**	0,22	11	8,3	7,6	78	12,8	20,3	0,12	0,56	0,19	1,23	2,88	4,09	0,02	1,01

Microbal Soil Analysis after 8 by Celestalab

	Carbone (g/kg terre)	Biomasse Microbienne (BM)		Éléments minéraux stockés dans la BM (calculés en kg/ha)					CARBONE				AZOTE			
Paramètre/ Parcelle		mgC/kg terre	en %C	N	P	K	Ca	Mg	C organique (g/kg TS)	C minéralisé (mg/kg/28j)	Ind. de minéralisation (%)	Cm/ BM	N total (g/kg)	N minéralisé (mg/kg/28j)	Ind. de minéralisation (%)	**Fourniture annuelle N (U)**
Plantation bio	19,8	**326**	1,6	**86**	**66**	**56**	**8**	**8**	19,8	339,4	1,7	37,1	1,7	18,7	1,1	**49,1**
Plantation Biodynamie	29,7	**600**	2	**158**	**122**	**103**	**15**	**15**	29,7	493,1	1,7	29,3	2,7	32,1	1,2	**72,2**
Vigne bio	15,7	**338**	2,2	**89**	**69**	**58**	**8**	**8**	15,7	338,1	2,5	41	1,7	19,2	1,2	**50,4**
Vigne biodynamie	24,1	**570**	2,4	**150**	**116**	**98**	**14**	**14**	24,1	631,9	2,6	39,6	2	30,6	1,5	**80,3**

For more details see Scientific report of Soin de la Terre (Boisseau study)

Soil Fertility and Biodiversity in Organic Farming - publié dans Science Vol 296 - 2002

Lien de la publication avec traduction en français

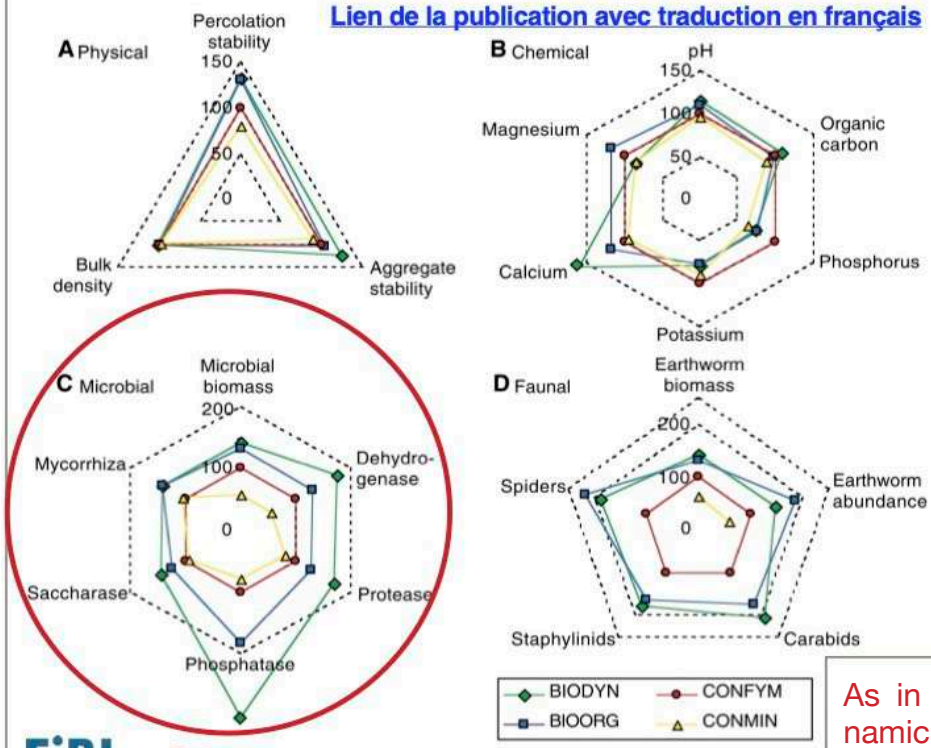


Fig. 2. Physical, chemical, and biological soil properties in soils of the DOK farming systems. Analyses were done within the plough horizon (0 to 20 cm) except for soil fauna. Results are presented relative to CONFYM (= 100%) in four radial graphs. Absolute values for 100% are as follows. (**A**) Percolation stability, 43.3 ml min^{-1}; aggregate stability, 55% stable aggregates > 250 μm; bulk density, 1.23 g cm^{-3}. (**B**) pH(H_2O), 6.0; organic carbon, 15.8 g C_{org} kg^{-1}; phosphorus, 21.4 mg P kg^{-1}; potassium, 97.5 mg K kg^{-1}; calcium, 1.7 g Ca kg^{-1}; magnesium, 125 mg Mg kg^{-1}. (**C**) Microbial biomass, 285 mg C_{mic} kg^{-1}; dehydrogenase activity, 133 mg TPF kg^{-1} h^{-1}; protease activity, 238 mg tyrosine kg^{-1} h^{-1}; alkaline phosphatase, 33 mg phenol kg^{-1} h^{-1}; saccharase, 526 mg reduced sugar kg^{-1} h^{-1}; mycorrhiza, 13.4% root length colonized by mycorrhizal fungi. (**D**) Earthworm biomass, 183 g m^{-2}; earthworm abundance, 247 individuals m^{-2}; carabids, 55 individuals; staphylinids, 23 individuals; spiders, 33 individuals. Arthropods have not been determined in the CONMIN system because of the field trial design. Significant effects were found for all parameters except for bulk density, C_{org}, and potassium (analysis of variance; $P < 0.05$). For methods, see table S3.

As in the EcoVitiSol study, the biodynamic soils have a more developed and efficient microbiological community.

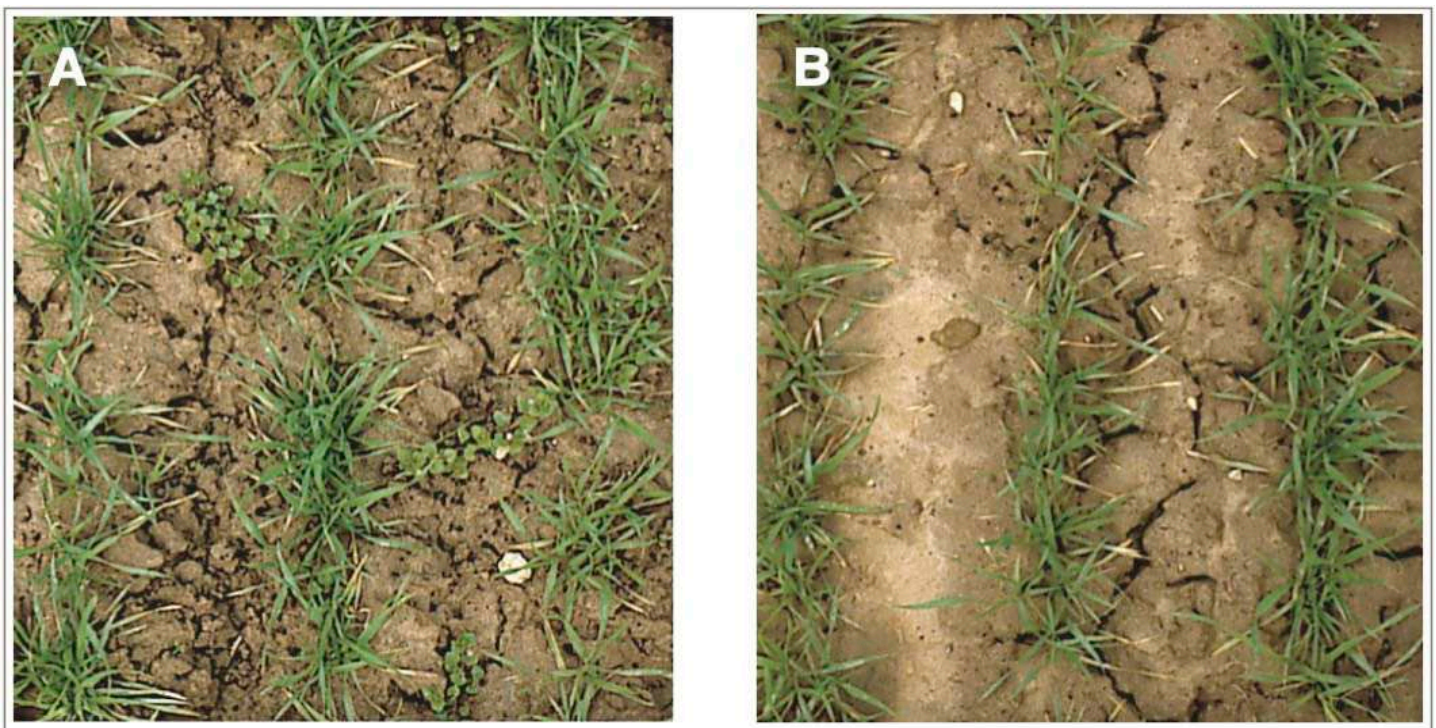
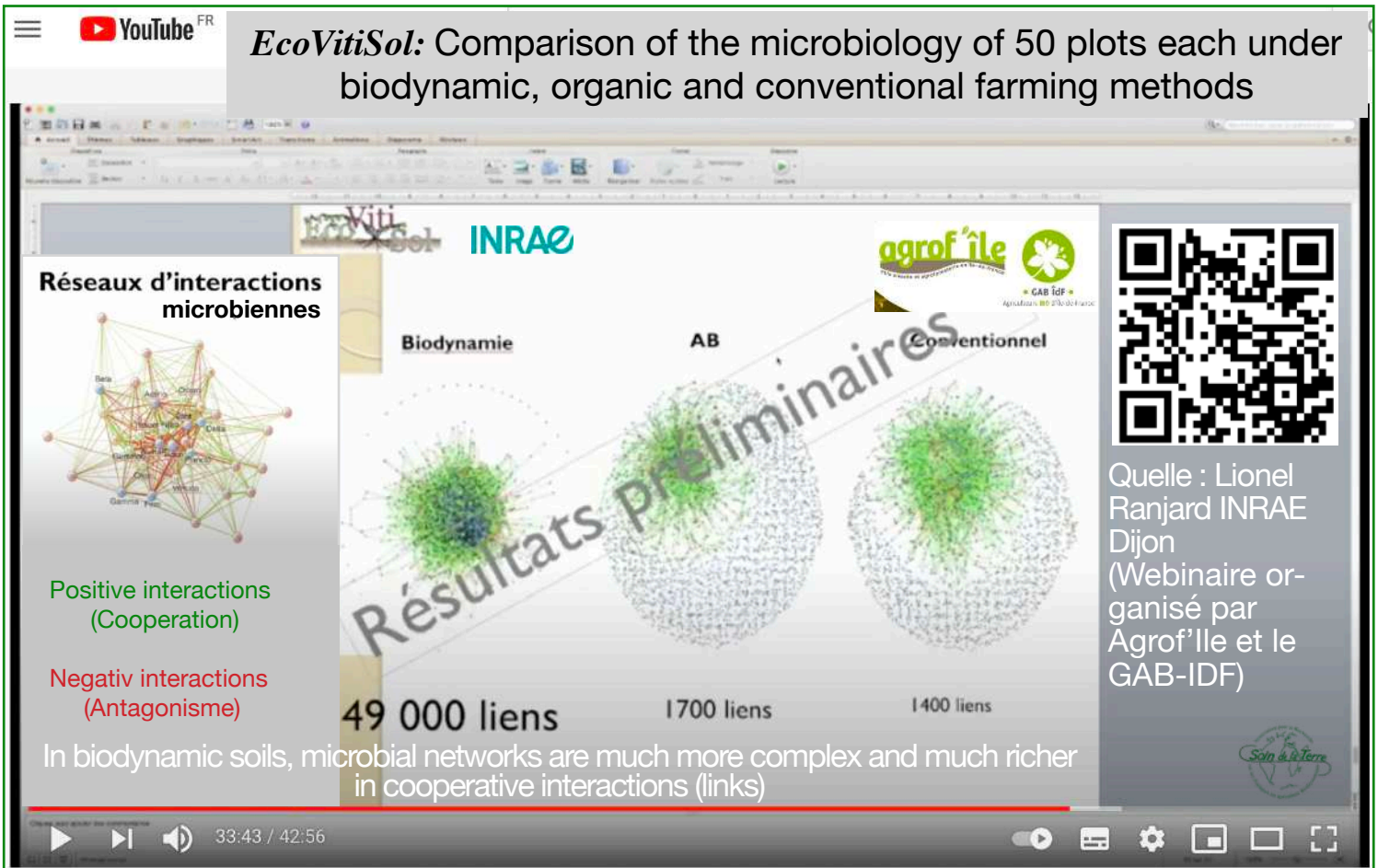


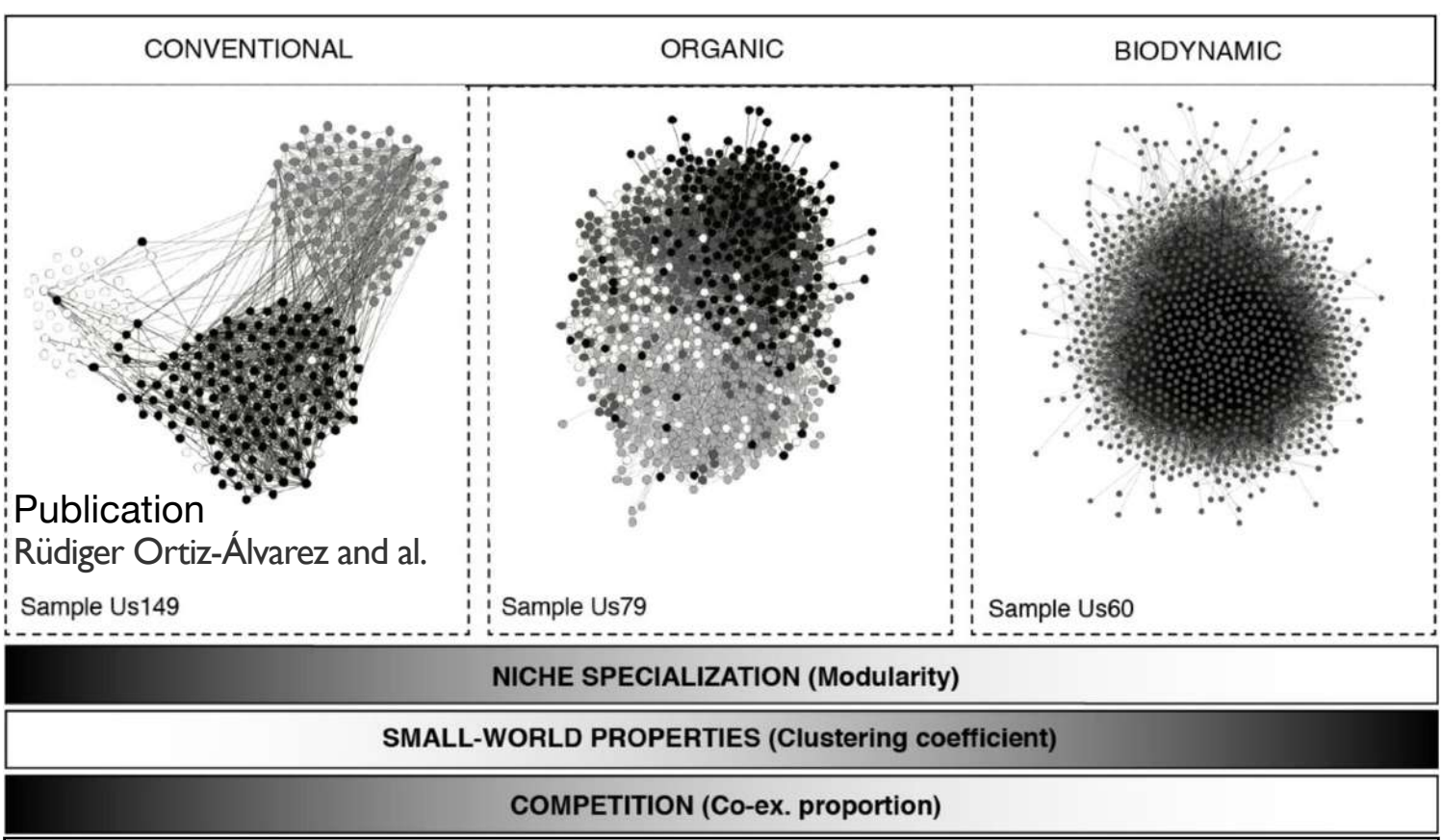
Fig. 3. Biodynamic (**A**) and conventional (**B**) soil surface in winter wheat plots. Earthworm casts and weed seedlings are more frequent in the biodynamic plot. Disaggregation of soil particles in the conventional plots leads to a smoother soil surface. Wheat row distance is 0.167 m. Source: T. Alföldi, Research Institute of Organic Agriculture [Forschungsinstitut für biologischen Landbau (FiBL)].

Science Vol 296 - 2002

Fig. 3 Surface des sols bio-dynamique (**A**) et conventionnel (**B**) dans les champs de blé d'hiver. Les déjections de vers de terre et les pousses de mauvaise herbe sont plus fréquentes dans le terrain bio-dynamique. La désagrégation des particules du sol dans les terrains conventionnels mène à une surface plus lissée. L'écartement des rangs de blé est de 0.167 m. Source: T. Alföldi, Institut de Recherche d'agriculture biologique [Forschungsinstitut für biologischen Landbau (FiBL)].



Microbiology in the vineyard : which management approach for a living soil?



Representation of microbial networks in vineyards from the publication "Emergent properties in microbiome networks reveal the anthropogenic disturbance of farming practices in vineyard soil fungal communities" by R. Ortiz-Álvarez et al. (https://doi.org/10.1101/2020.03.12.983650).This study is based on 350 plots of table grapes in Spain and in the United States and shows the same tendencies in favor of biodynamic farming as those of INRAE in the context of the EcoVitiSol project.

Drinks International
@DrinksIntMag

Début de la biodynamie en 2008

Drinks International has named @LouisRoederer_ as the World's Most Admired Champagne Brand in 2020 🥂, a magazine which ranks champagne brands from 1-30 based on the votes of the world's top wine experts. Read more: shorturl.at/fhxIP

Traduire le Tweet

11:54 AM · 28 févr. 2020 · Twitter Web App

Le passage progressif du vignoble en bio et en biodynamie a été motivé par la qualité du vin

Decanter Magazine (Internet edition of 13 October 2014) : Since the last vintage (millésime), all Louis Roederer Cristal et Cristal Rosé champagnes come from biodynamic cultivation. - According to the cellar master, Jean-Baptiste Lecaillon, **'the biodynamic method gives the wine an additional purity and liveliness'** (note: Cristal de Roederer is considered by many wine lovers to be the world's best Champagne).

Le Figaro of 22-01-2013 : Myth of myths : La Romanée-Conti : The estate has been organic since 1985, with 7 ha in biodynamic farming for a long time, and since 2007 entirely biodynamic, without making a commercial argument of it, but because **"this is what gives the best wine"**. (note: La Romanée-Conti is considered by many wine lovers as the most prestigious wine estate in the world).

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